

Results from ValleyCAN Tune In & Tune Up 2005 Program - Fresno, CA

plus...

Preliminary Results from
Bakersfield Tune In & Tune Up 2006 Program

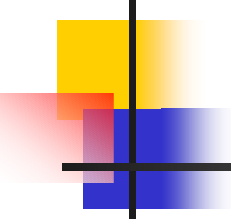
Sponsored by
Valley CAN Program
Assistance from Advance Transportation Technology Center -
Fresno City College
California Bureau of Automotive Repair
Breathe Easier Program

Douglas R. Lawson
February 27, 2007



Program Objectives

- Evaluate effectiveness of remote sensing to identify possible high emitters for repair
- Calculate emission benefit and cost-effectiveness of Tune In & Tune UP 2005 Program in Fresno



Fresno Tune In and Tune Up Program - September 17, 2005

- Started at 9 a.m.; more than 100 vehicles waiting for remote sensing emissions measurements
- Motorists drove their own vehicle past single remote sensing device (RSD) on voluntary basis to obtain emissions reading
- 332 "beam blocks"; 160 vehicles with valid readings for all pollutants; 99 were high emitters according to remote sensing
 - CO > 5% (23 vehicles)
 - HC and NO > 1000 ppm (29 and 70 vehicles, respectively)
 - RSD data provided by BAR
- \$500 repair voucher offered to drivers of high emitters
- 97 vehicles entered repair program at A-1 Auto Electric repair shop
- 5 vehicles were "smokers"

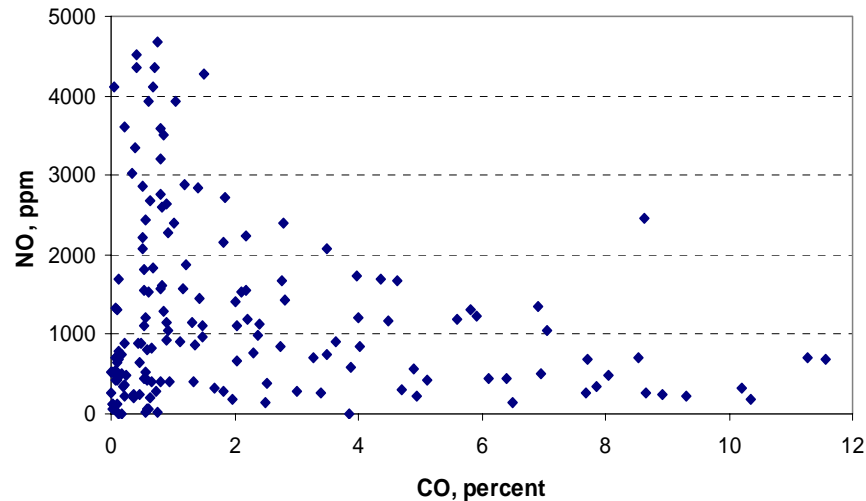
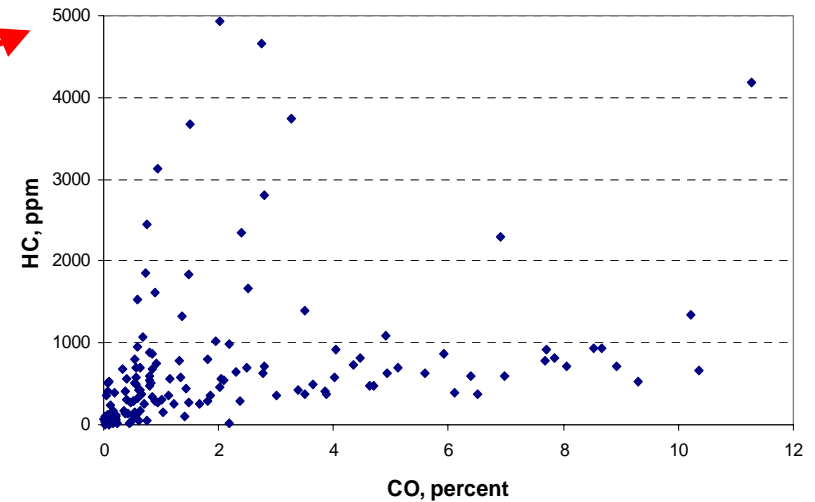
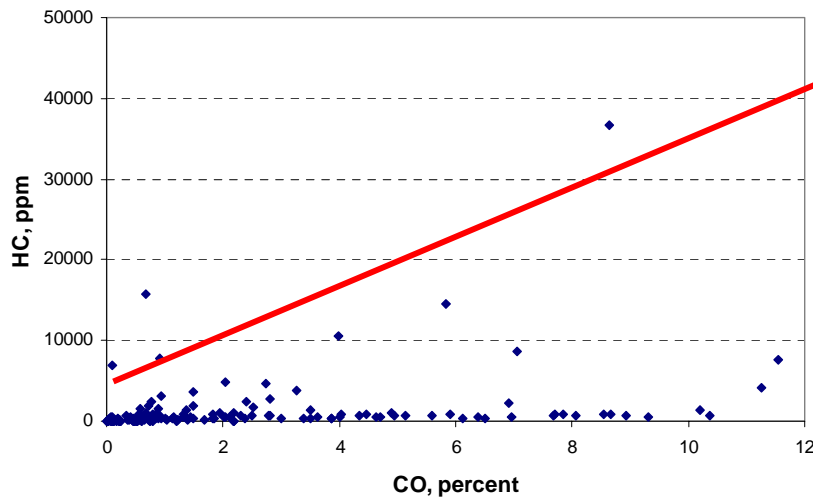
Remote Sensing Data

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CO CO₂ HC NO "smoke"

Remote Sensing Data, 160 vehicles

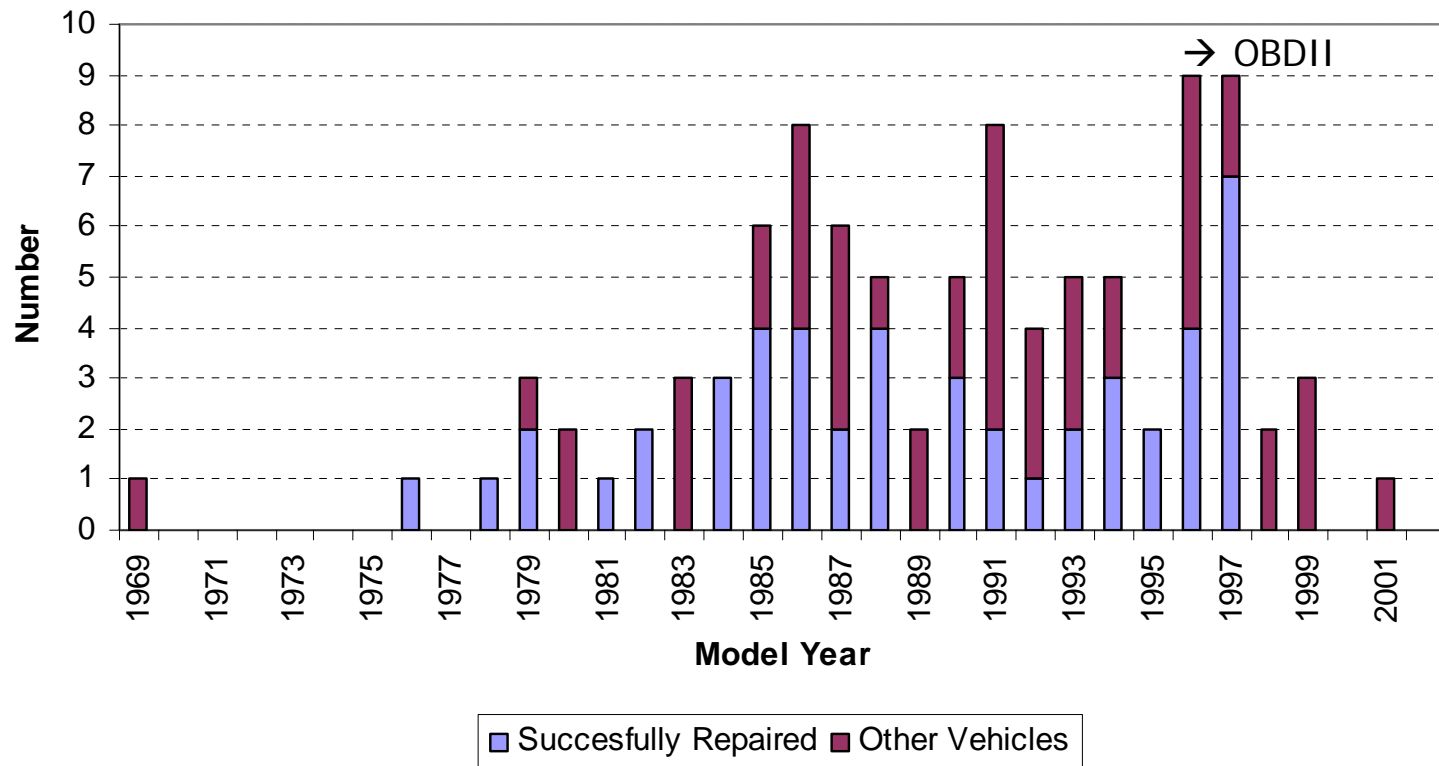




Vehicles in TI&TU 2005 Program

Vehicle Status	Ave. Costs/Vehicle (Inc. Smog Check)
Failed Smog Check and successfully repaired, n=48	\$575
Failed Smog Check and successfully repaired, no pre-repair information, n=9	\$531
Partial repairs, n=10	\$235
Didn't repair and left program, n=10	\$126
Couldn't repair, n=2	\$394
Exempt, n=2	\$228
Didn't test; extensive repairs needed, n=7	\$16
Passed Smog Check, n=7	\$52
Minor repairs, n=2	\$76

Vehicles in TI&TU 2005 Program



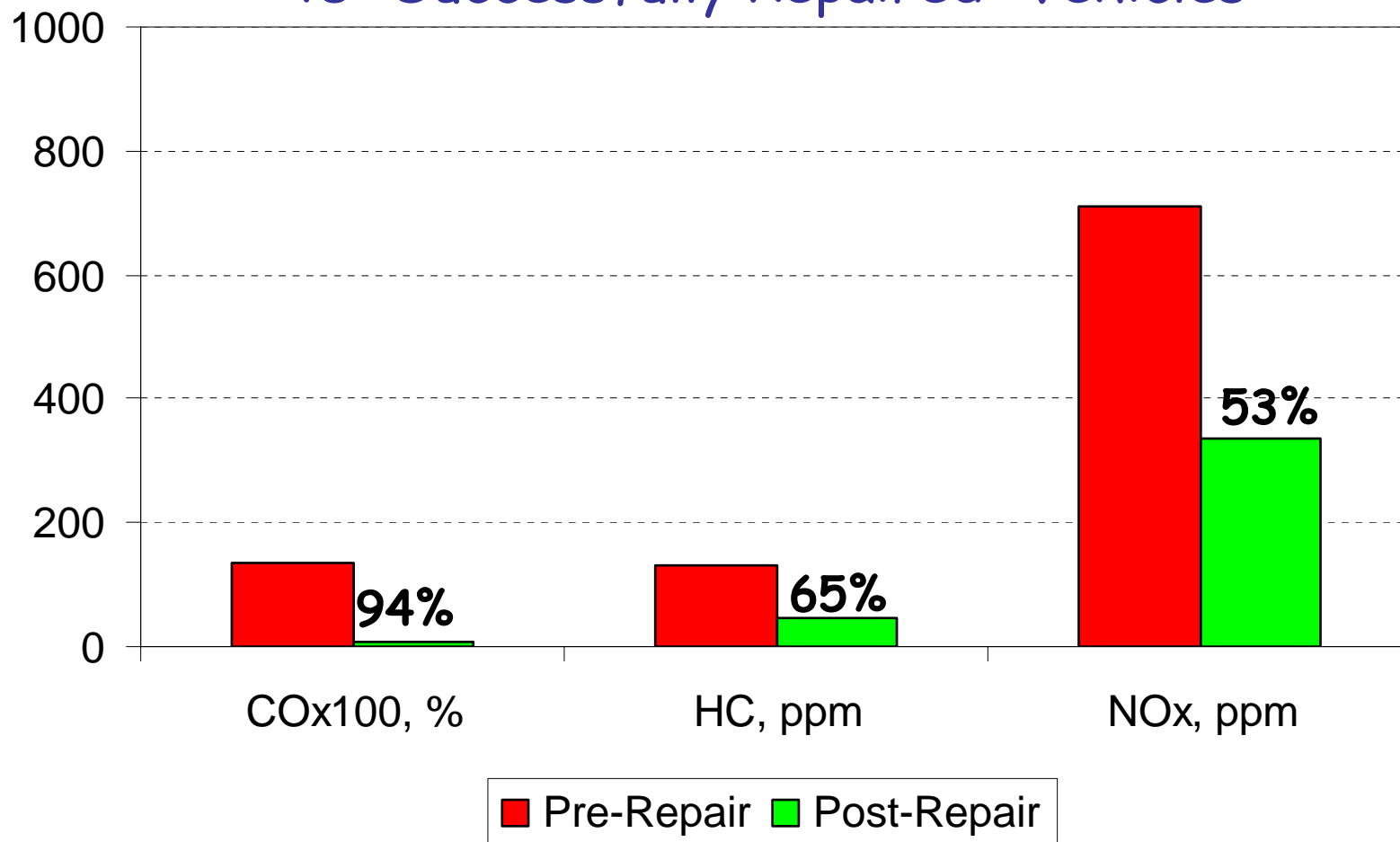


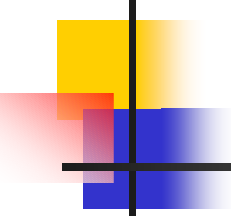
Manufacturers

BMW	2	Kia	2
GM	24	Mazda	1
DCX/MBz	14	Mitsubishi	2
Ford/Linc/ Mercury	25	Nissan	6
Honda/Acura	7	Toyo/Lexus	13
Hyundai	1		

Pre- and Post-Repair Ave. ASM Emissions — Fresno

48 "Successfully Repaired" Vehicles





Emission reductions from 48 repaired vehicles — Fresno

Emission Reductions	CO	HC	NOx
Pounds per vehicle	540	49	29
Pounds from 48 vehicles	25,918	2,355	1,393
Tons from 48 vehicles	13	1.2	0.70

Assumption: Repairs are good for 10,000 miles



TI&TU Fresno and 1995 Calif. I/M Pilot Study Repair Data

Program	Ave. ASM Emissions, Pre/Post Repair			Percent Reduction		
	CO, %	HC, ppm	NOx, ppm	CO	HC	NOx
I/M Pilot ("Gold Standard")	1.36/0.22	160/50	884/419	84	69	52
Fresno	1.39/0.09	131/46	710/335	94	65	53



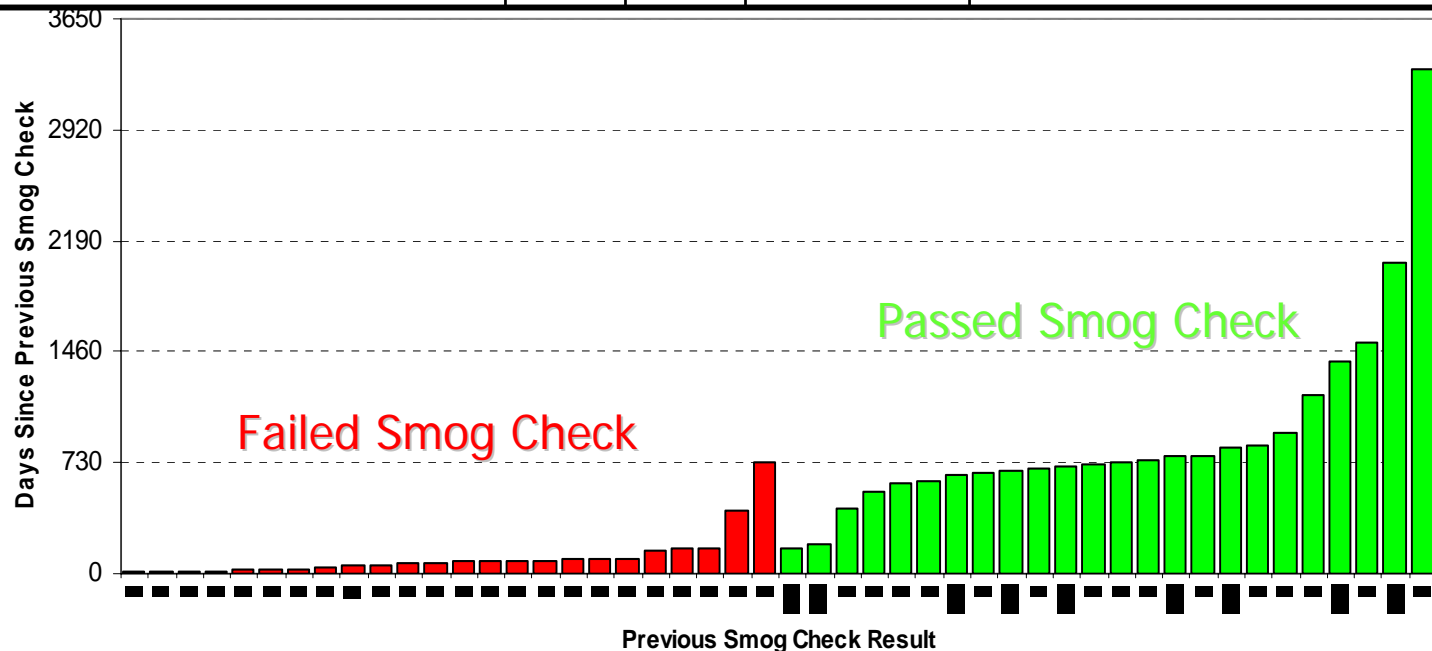
TI & TU Fresno Follow-Up

How long do high emitters stay repaired?

- Recruitment goal of 20 vehicles
- Program participants contacted by phone
- 11 people responded for a follow-up Smog Check inspection
- After ~300 days, 7 out of 11 vehicles passed the emissions portion of the Smog Check test
 - One not tested - engine knock
 - Three failed for emissions; one was gross polluter

Prior Smog Check Results for Fresno Vehicles

Vehicle Status	Pass	Fail	Gross Polluter?	Days Since Previous Smog Check (Min/Max/Mean/Median)
Failed Smog Check and successfully repaired, n=48	24	24	9	16/ 3312/ 508/ 304

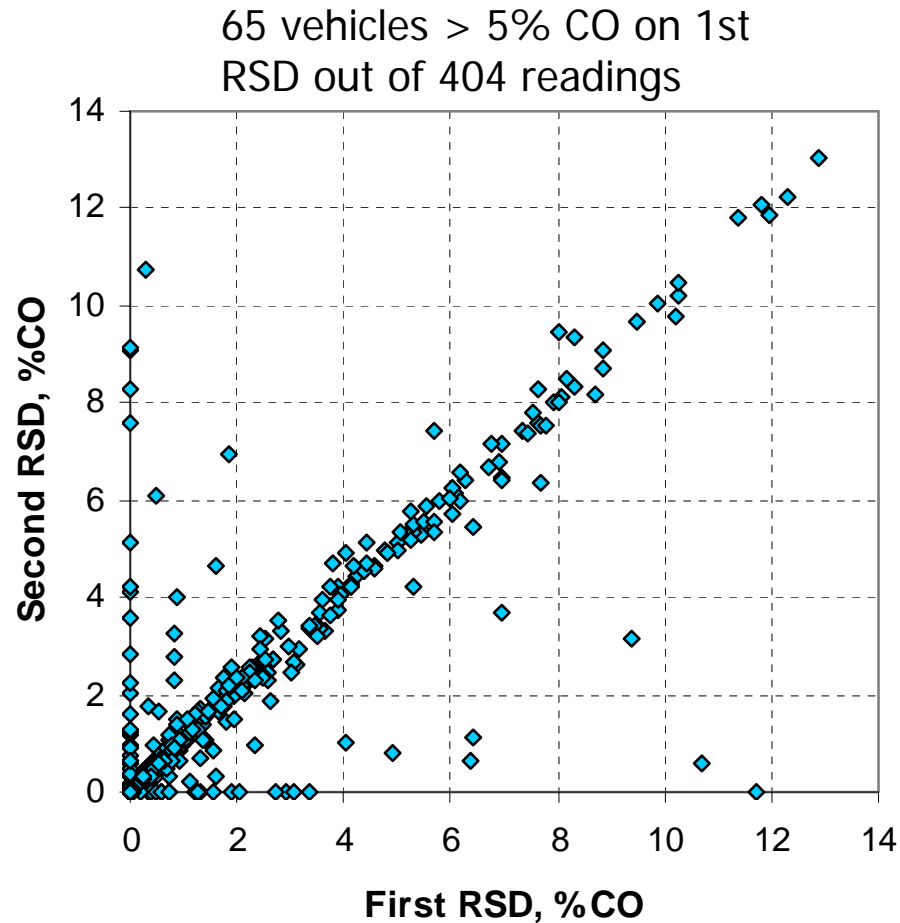




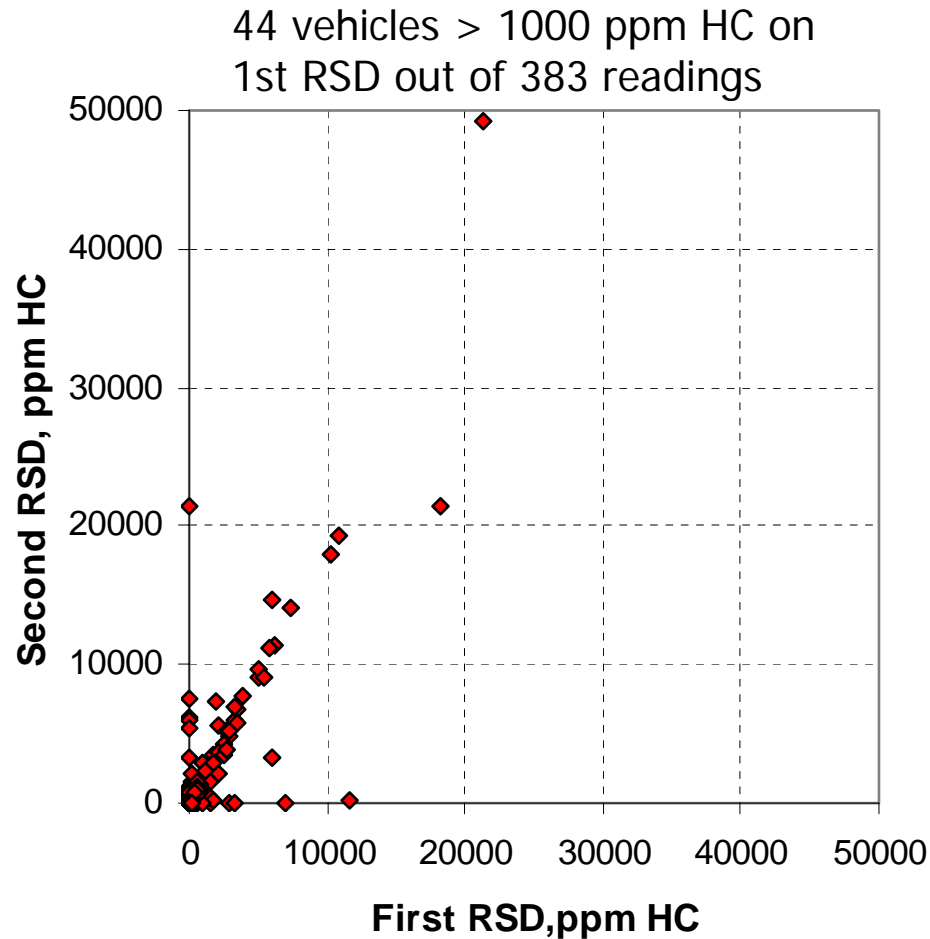
2006 Bakersfield Tune In & Tune Up Program - March 25, 2006

Preliminary Data

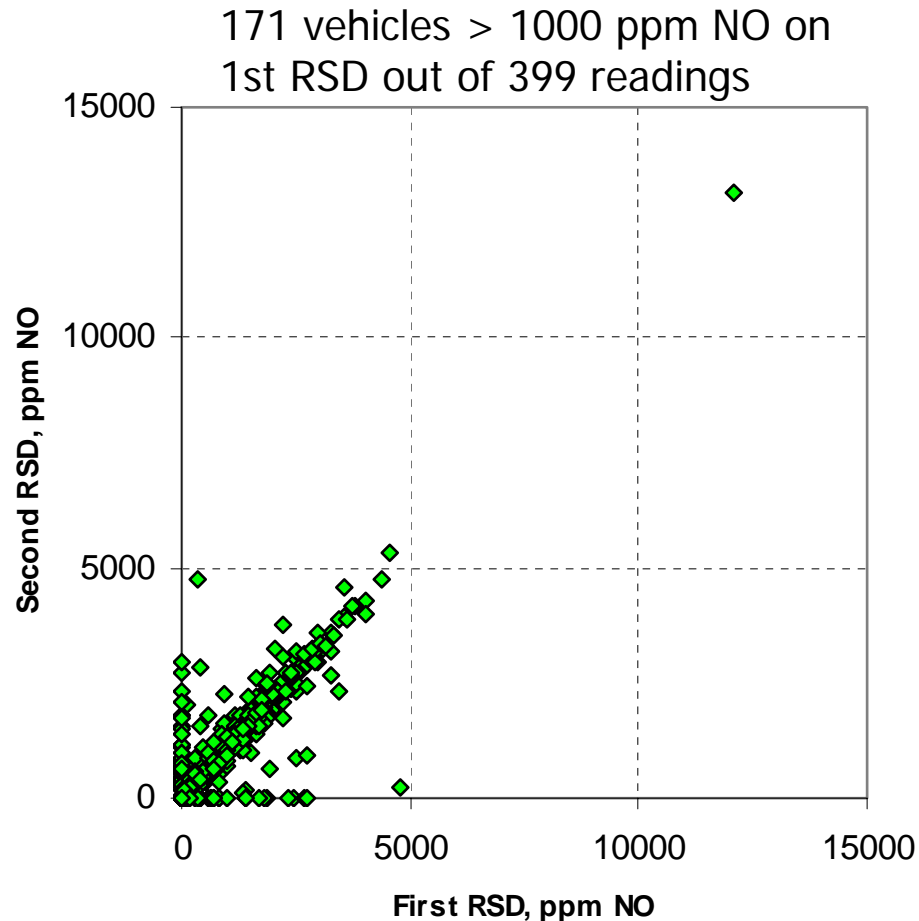
Bakersfield Remote Sensing CO Data - March 25, 2006

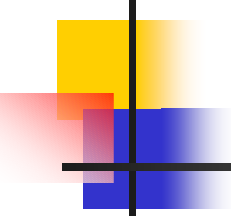


Bakersfield Remote Sensing HC Data - March 25, 2006



Bakersfield Remote Sensing NO Data - March 25, 2006





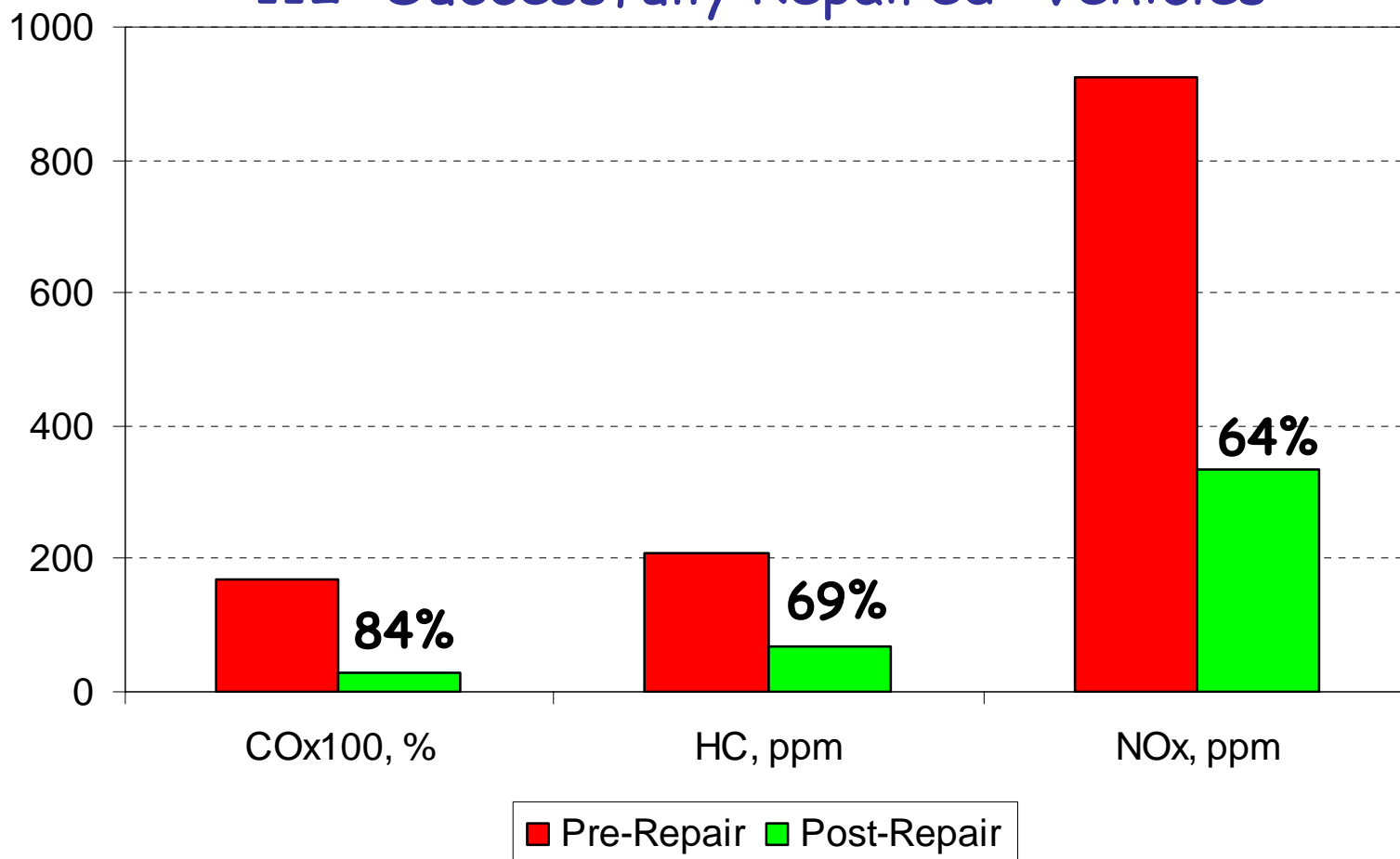
Emission reductions from 112 repaired vehicles — Bakersfield

Emission Reductions	CO	HC	NOx
Pounds per vehicle	614	66	33
Pounds from 112 vehicles	68,758	7,423	3,736
Tons from 112 vehicles	34	3.7	1.9

Assumption: Repairs are good for 10,000 miles

Pre- and Post-Repair Ave. ASM Emissions — Bakersfield (Preliminary Results)

112 "Successfully Repaired" Vehicles





TI&TU Fresno and Bakersfield and 1995 Calif. I/M Pilot Study Repair Data

Program	Ave. ASM Emissions, Pre/Post Repair			Percent Reduction		
	CO, %	HC, ppm	NOx, ppm	CO	HC	NOx
I/M Pilot ("Gold Standard")	1.36/0.22	160/50	884/419	84	69	52
Fresno	1.39/0.09	131/46	710/335	94	65	53
Bakersfield*	1.68/0.27	210/67	923/333	84	69	64

*Preliminary Data



Cost-Effectiveness of Tune In & Tune Up Program



Cost-effectiveness of repairs to 48 “completely-repaired” vehicles

- $[CO + HC + NO_x] = <\$1900/\text{ton}$
 - $[1/7CO + HC + NO_x] = <\$7500/\text{ton}$
 - $[HC + NO_x] = <\$14,900/\text{ton}$ (Fresno)
 - $[HC + NO_x] = <\$8,700/\text{ton}$ (Bakersfield)
(Bakersfield data are preliminary!)
-
- Maximum costs; do not include nontailpipe HC reductions as they were not measured. True costs would be lower than these amounts.
 - Assumption: Repairs are good for 10,000 mi.



Thought Experiment...

If we find and repair 10,000 vehicles

- 1.2 million passenger cars in San Joaquin Valley Unified APCD
- Highest 1% of emitters \cong 10,000 vehicles
- Emission Reductions: 577 lb of CO; 58 lb HC; 31 lb NO_x in per year per vehicle (10,000 miles)
- 2885 tons CO; 290 tons HC; 155 tons NO_x per year: cost \$1500/ton CO+HC+NO_x or \$11,800/ton of HC+NO_x (not including evap HC and PM reductions)
- Roughly 10 tons CO+HC+NO_x/day in one year from 10,000 high-emitting vehicles



Summary

- 1995 Fresno Tune In & Tune Up Program very successful in achieving emission reductions from light-duty vehicles
- Remote sensing quickly identified high-emitting vehicles with low false failure rate
- Emission reductions in Fresno TI&TU 2005 program were comparable to those obtained in ARB's 1995 I/M Pilot Study
 - Quantifiable emission reductions (not modeled)
- Need more information on retaining vehicles in repair program and understanding duration of repairs (should the high emitters be repaired or scrapped?)